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EXAMINER

NADAV, ORI

ART UNIT

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2811

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Response to Arguments

1. Applicant argues that Lee does not teach or suggest a dielectric film having a dielectric constant that is higher than that of the AHO film between the upper electrode and the AHO film as recited in claim 22.

Claim 22 recites a dielectric film having a dielectric constant that is higher than that of the AHO film between the upper electrode and the AIO film, wherein the dielectric film is an HfO₂ layer, a ZrO₂ layer or an STO layer. That is, an HfO₂ layer, a ZrO₂ layer or an STO layer have a dielectric constant that is higher than that of the AHO film. Lee et al. teach in column 2, lines 66-67 a dielectric film being an HfO₂ layer or a ZrO₂ layer. Therefore, Lee et al. teach a dielectric film having a dielectric constant that is higher than that of the AHO film between the upper electrode and the AHO film, as recited in claim 22.

2. Applicant argues that the materials for the first and second layers are not interchangeable, because the citation on column 7, lines 23-24, which states that layer 20 can include HfO₂ is a typographical error, because “as the rest of that paragraph (lines 20-22 and 25-29) state that the total thickness of the second layer 20 is preferably not more than one third of the total thickness of the high-k dielectric layer 14 and the thickness of Al₂O₃ is preferably approximately 33% of the total thickness of the high-k dielectric layer to achieve minimization of net fixed charge and a high dielectric constant of not less than k=20”.

The fact that the **following** paragraph recites that the total thickness of the second layer 20 is **preferably** not more than one third of the total thickness of the high-k dielectric layer 14, does not mean that the citation in the previous paragraph is a typographical error. Although the examiner does not agree that the Lee et al.'s patent includes a typographical error, the examiner will accept applicant's position if applicant provides an affidavit from the inventor, Jongho Lee, stating that the citation in column 7, lines 23-24 is a typographical error.

3. Applicant argues that the combination of Al and HfO disclosed in Chang is used to coat the outside surface of a metal article and not as a dielectric layer of a capacitor as recited in claim 22.

Although Chang et al. use the composite material obtained by the combination of Al and HfO for coating applications, and not as a dielectric layer of a capacitor, the composite material is not applicable only to coating applications. Chang et al. teach that the composite material is more stable than AlO alone. Clearly, an artisan forming an AlO dielectric layer for a capacitor, would be motivated to replace the AlO material with the more stable composite material of Chang et al., in order to improve the capacitor characteristics. Note that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

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4. Applicant argues that “the combination of Chang and Conley fails to disclose a dielectric film between an AHO film and an upper electrode and in direct contact with the upper electrode as recited in claim 22, because uppermost layer of the dielectric layer structure disclosed in Conley is an AIO film, and thus the AHO film would be in contact with an upper electrode formed on the dielectric layer structure”.

The examiner agrees that Conley, Jr. et al. do not explicitly state that the dielectric film is directly in contact with the upper electrode, because layer 144' is the most upper layer. However, the examiner asserts that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to form the dielectric film in direct contact with the upper electrode, in order to use the capacitor in an application which requires specific electrode positioning.

Note that the elements a “lower electrode” and an “upper electrode”, as recited in claim 22, are interchangeable, because the terms “lower” and “upper” depend on the direction from which the structure is viewed. A recitation of a base structure, such as a substrate, will explicitly define the “lower electrode” and the “upper electrode”, and may overcome the rejection, as recited in the previous office action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ori Nadav whose telephone number is 571-272-1660. The examiner can normally be reached between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

O.N.
5/3/2010

/ORI NADAV/
PRIMARY EXAMINER
TECHNOLOGY CENTER 2800